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ABSTRACT

Educational theorists frequently use the term "model" to denote a simplified picture of the reality of a theoretical approach or a school of thought. In branches of empirical science, including education, experimental data are often correlated with mathematical symbols, which makes it possible to interconnect these symbols in an exact way. Models can be used to explain causal relationships or to test hypotheses and theories. Although models present simplified pictures of reality, they are seldom exclusively descriptive; rather, they tend to show causal relations and clarify which variables in a given system are dependent and which are independent. Other types of models that have been used in writings about education are the hierarchical model and the algorithm-type model. Another type of simplifying model is one that aims at delineating concepts and areas of research. In many cases, the dividing line between an argumentative outline of a theory (or description) and a model is far from clear. Educational theorists have relied on both functional and normative models. Some of these represent positions within a philosophy of education leading to explicit concerns about ideological issues. On the other hand, they aim at guiding the teaching-learning process and thus develop various schemes that systematize the concepts that are important to them. The difference between functional and normative educational models may be viewed in terms of contrasting attempts to separate scholarship from value judgments and attempts at normative pedagogy. A 79-item reference list concludes the document. (MN)

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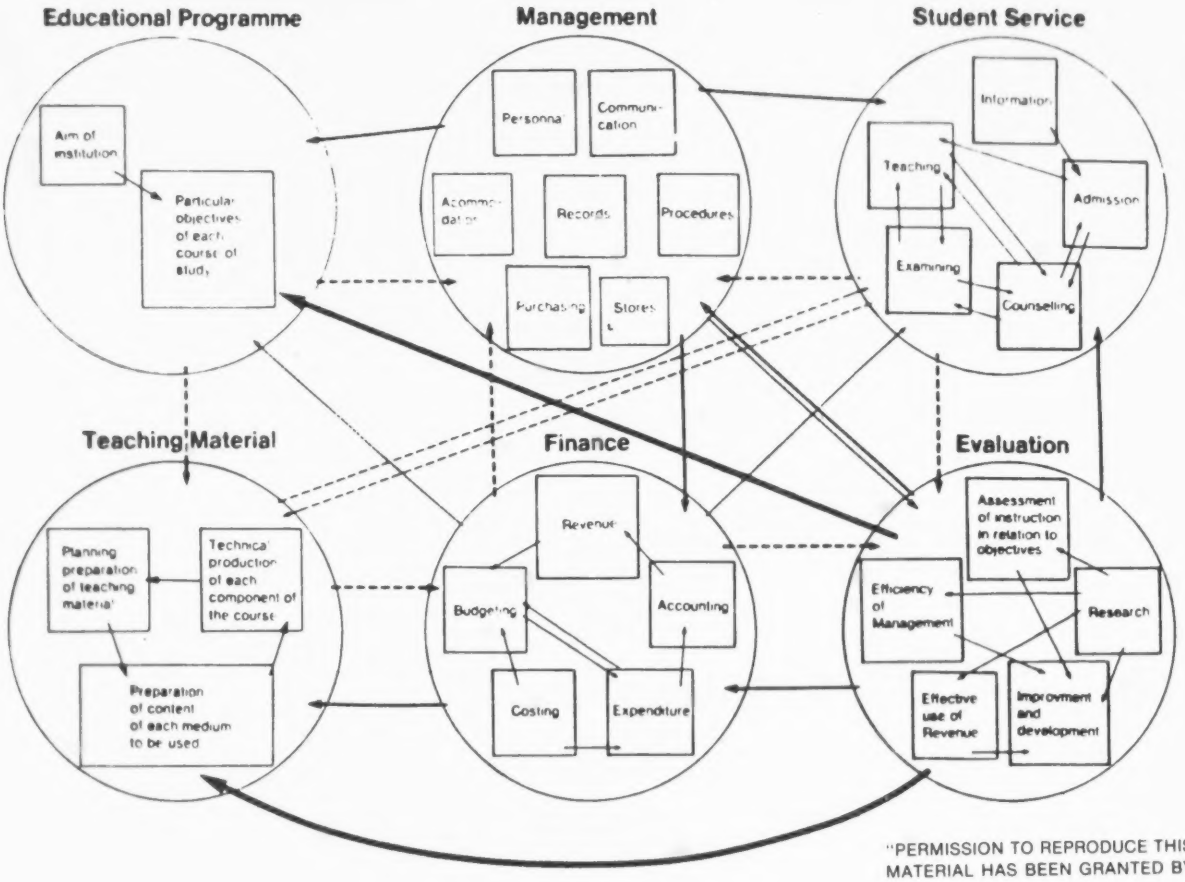
ZIFF PAPIERE 62

Börje Holmberg

THEORETICAL APPROACHES, CATEGORIES AND METHODS DESCRIBED AS EDUCATIONAL MODELS



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SUMMARY

This study analyses some important applications of the model concept and the interpretation of the term model as theory and as general approach. The model concept is shown to be vague. Nevertheless, the description of a research phenomenon in education as a model can be useful if referring to distinctive, clearly delineated approaches. It can then include factual descriptions, presentations of hypothetical relations between variables and general interpretations of educational phenomena.

The study made of various well-known 'models' has caused a survey of important theoretical approaches, categories and methods used in education and educational research. Those discussed represent a sélection which, though not wholly idiosyncratic, was made both with a view to including some German thinking largely unknown outside the German-speaking countries and on the basis of personal interest.

An essential distinction is made between functional and normative educational models, which implies contrasting attempts to separate scholarship from value judgements with attempts at normative pedagogy.

ZUSAMMENFASSUNG

In diesem Papier werden einige wichtige Anwendungsformen des Modellbegriffs analysiert sowie seine Interpretation aus Theorie und als allgemeiner Ansatz. Der Modellbegriff erweist sich dabei als recht vage. Dennoch kann es nützlich und sinnvoll sein, einen Forschungsgegenstand in der Pädagogik als Modell zu beschreiben, wenn man sich auf spezifische, klar abgegrenzte Ansätze bezieht. Die Beschreibung von Fakten, die Darstellung hypothetischer Zusammenhänge zwischen Variablen und allgemeinen Interpretationen von Phänomenen aus der Pädagogik können dann mit einbezogen werden.

Die Untersuchung einiger bekannter "Modelle" hat zur Erstellung einer Übersicht über wichtige theoretische Ansätze, Kategorien und Methoden - die in der Pädagogik und der erziehungswissenschaftlichen Forschung entwickelt wurden - geführt. Bei der Auswahl der behandelten Modelle, obwohl sie nicht vollkommen idiosynkratisch war, spielte sowohl der Wunsch, deutsche Konzepte einzubeziehen, die außerhalb der deutschsprachigen Länder weitgehend unbekannt sind, als auch persönliches Interesse, eine Rolle.

Es wurde eine grundsätzliche Unterscheidung zwischen funktionalen und normativen Erziehungsmodellen gemacht. Diese Unterscheidung impliziert gegensätzliche Versuche, Wissenschaft und Werturteile, die auf eine normative Pädagogik abzielen, von einander zu trennen.

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The model concept

The term model occurs with fairly great frequency in scholarly presentations of economical, social and educational problems. In many cases it seems to be used rather vaguely, however. This vagueness is illuminated in the following extract from Nuthall & Snook 1973:

> In general, it can be said that a model may be used for imitation, description, explanation, prediction or persuasion. An artist imitates his model, and a model child is one to be imitated. A map of France and a diagram of the human body are iconic models which a lecturer may use to help him describe the landscape of a country or the physiology of human beings. A scientist may use analogue and symbolic models to explain data, to suggest predictions, or to stimulate factors which cannot be manipulated in the real world. Finally, a model may be used to persuade people to adopt some policy or ideal: "melting pot" and "brotherhood of man" are examples of this kind of model (cf. MacIver & Holdaway 1966).
>
> Within education the term "model" is used in similarly diverse ways. Model teachers and model lessons are used as exemplars for teachers to imitate and as standards for evaluation. Educational practice has been described and justified, praised and condemned in terms of authoritarian, democratic, child-centered and traditional models.
>
> (Nuthall & Snook 1973 p. 47)

Whereas mathematicians sometimes identify model theory with semantics[1], the model concept is frequently used by economists, educationists and others to denote a simplified picture of

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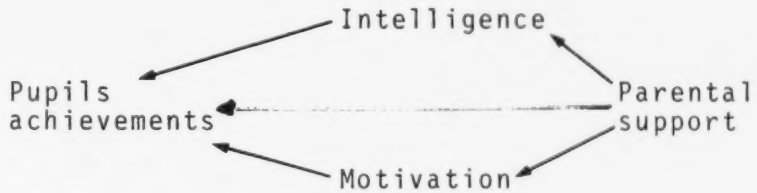
1 Thus Kreisel, G. & Krivine, J.L. (1972) refer to 'model theory also called "semantics"'. They add: 'Die für die Modelltheorie grundlegenden Begriffe beziehen sich auf: verschiedene Arten von Sprachen; deren Realisierungen, d.h. geeignete Klassen von mathematischen Strukturen; und Modelle einer Formel(menge) der betrachteten Sprache, d.h. Realisierungen, die die Formel(n) erfüllen ' (from Introduction I to the German translation/by J. Jung/, p. IX).

reality of a theoretical approach or of a school of thinking. In empirical science, including education, experimental data are often correlated with mathematical symbols, which makes it possible to interconnect these symbols in an exact way. Schemes of this kind are usually referred to as models.

Models in educational disciplines: types and examples

A model illustrating assumed causal relations in education can look like this:



This model[2] shows the assumption of direct causal influence on pupils' school achievements of the home atmosphere and family customs (reading, conversations about cultural matters, theatre-going etc.), but also the indirect influence of the family which is taken to promote on the one hand intelligence, on the other hand motivation. Both are supposed to lead to good school results. As the model is described in the graph, parental support is the only independent variable, however.

However advantageous it may be in this way to develop exact but simplified presentations there is, in education as well as in other areas of research, a risk that important nuances

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2 I owe this example to Dr. Frank Faulbaum of the University of Mannheim, who used it in a seminar lecture on the testing of social-science hypotheses in the FernUniversität Institute for Research into Distance Education (ZIFF) on 6 May, 1983.

may be lost in models of this schematic type. This is true particularly of mathematical models. With Capra we could say

> that ordinary language is a map which, due to its intrinsic inaccuracy, has a certain flexibility so that it can follow the curved shape of the territory to some degree. As we make it more rigorous, this flexibility gradually disappears, and with the language of mathematics we have reached a point where the links with reality are so tenuous that the relation of the symbols to our sensory experience is no longer evident. This is why we have to supplement our mathematical models and theories with verbal interpretations, again using concepts which can be understood intuitively, but which are slightly ambiguous and inaccurate.
> It is important to realize the difference between the mathematical models and their verbal counterparts. The former are rigorous and consistent as far as their internal structure is concerned, but their symbols are not directly related to our experience. The verbal models, on the other hand, use concepts which can be understood intuitively, but are always inaccurate and ambiguous.
>
> (Capra 1975 p. 34)

It is evident that in education we cannot do without what Capra calls verbal models. Experience confirms that the flexibility inherent in them is often combined with the type of vagueness mentioned by Nuthall & Snook as quoted above. The unavoidable conclusion is that to be really useful the model concept must, in educational research, be less exact than in mathematics. It seems reasonable to describe clearly delineated approaches to educational problems as models.

A model is sometimes seen as something ideal, worth imitating, or as an approved solution with which various attempts, achievements, curricula or courses are compared. This use of the model concept is of little interest, however, and need not cause any discussion. The model concept becomes more of an issue for discussion when it occurs in designations like the behaviour-control model, the discovery-learning model, the rational model (cf. Nuthall & Snook 1973), the organiser model , the model for facilitation of learning (Bååth 1979) etc.

From the examples just quoted it would seem possible to

interpret model as a theory. This has also been done, thus, e.g. by Brodbeck 1963, who states that model is frequently used for either highly speculative or quantified theories. She adds that the 'term model serves no particular purpose beyond, perhaps, emphasizing the tentative, unconfirmed nature of the hypotheses in question' (Brodbeck 1963 p. 88). This and similar interpretations have been energetically contradicted, however, by others who regard models as support to clear thinking in that only essentials are included. According to Kromphardt & Clever (1980 p. 19) it is essential that a model should not be confused with a theory. They claim that a model should be based on assumptions which have not been and are not meant to be empirically tested. The only statements that can be derived from a model are those that specify the consequences of assumptions made - to the extent that the latter apply.[3]

Whereas this conclusion is no doubt correct, educationists using the model concept often do so with a view to illuminating their testable hypotheses and theories. To Ziegler 1972 a model is a formalised, interpreted part of a theory (p. 19). Apart from referring to systems of hypotheses, models are in educational writings also used in a descriptive way without any specific conditions specified although they may more or less clearly indicate cause-effect relationships. Here their character of simplified pictures of reality stands out. They simplify what is to be described in the same way as a drawing simplifies a picture of a machine in which irrelevant details, visible in a photo, are disregarded. Illustrations 1 and 2 are examples of such descriptive educational models. These illustrations identify both descriptive elements and processes, the latter by arrows indicating lines of influence.

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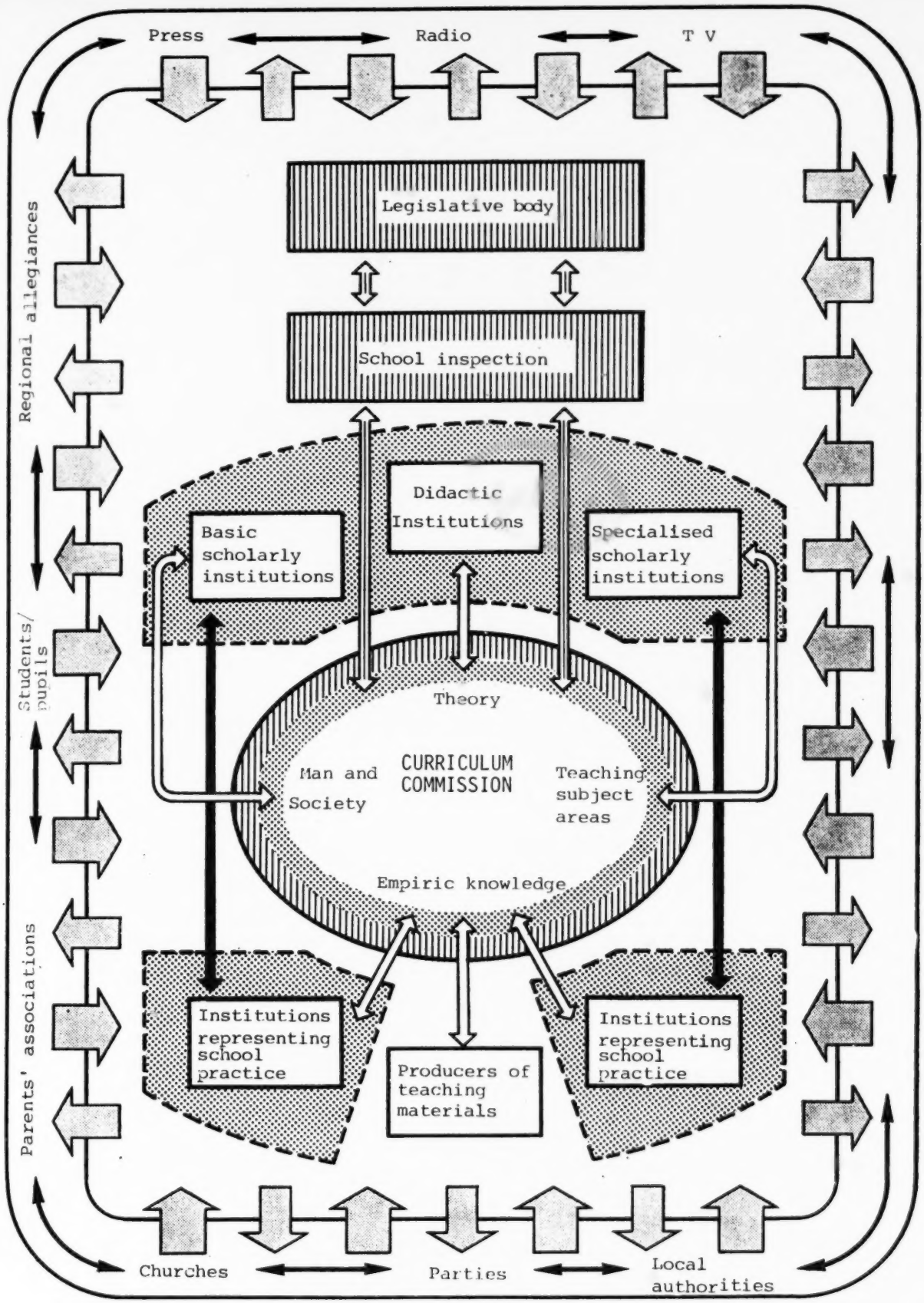
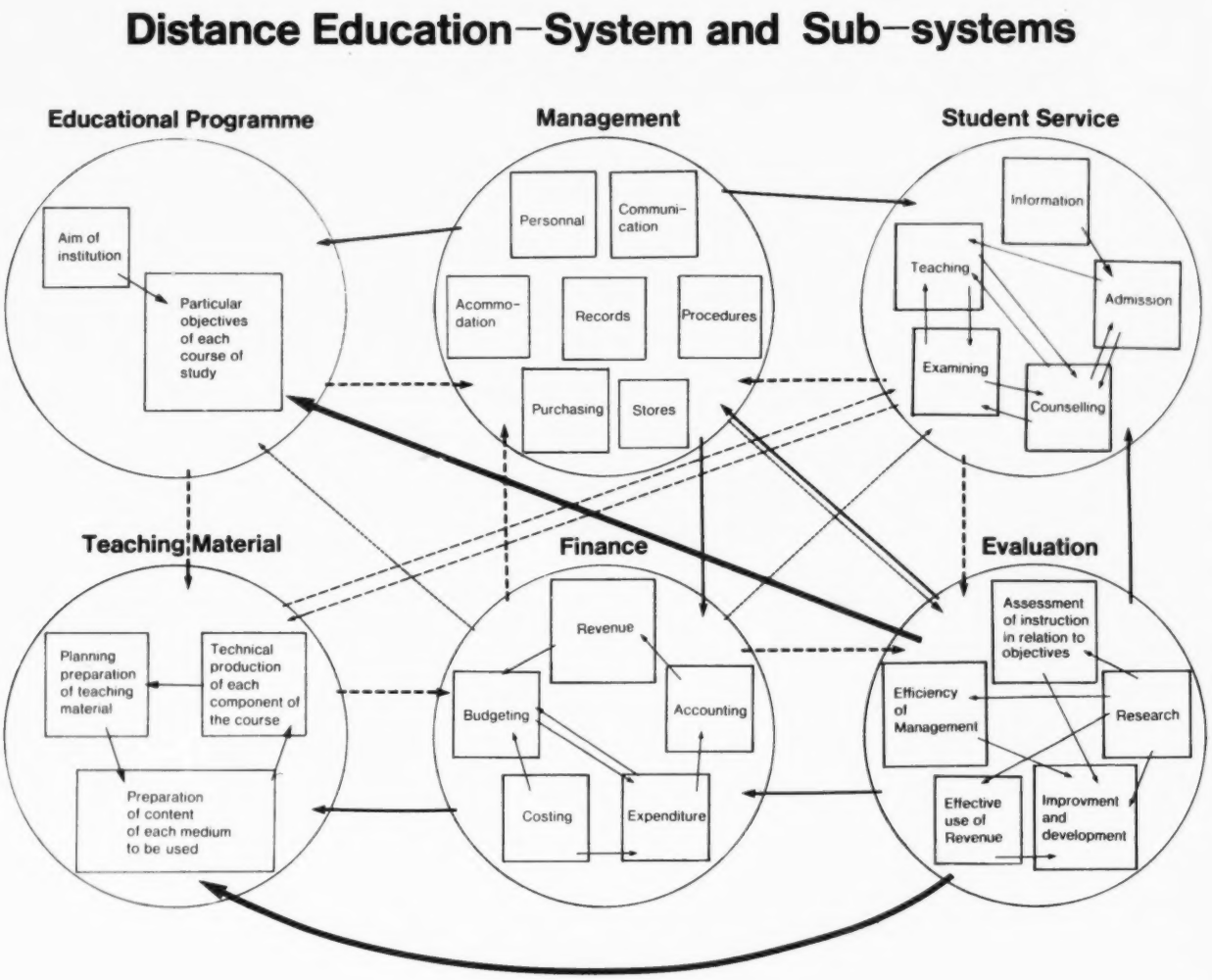
3 Cf.: "Das Modell ist ein in sich widerspruchsfreies System von Hypothesen (Axiomen, Deduktionen, Prognosen), die als prinzipiell verifikationsbedürftig begriffen werden - es ist ein Konstrukt auf Widerruf" (Popp 1970 p. 50). Cf. further Blalock 1971 who describes models involving one-way causation as heuristic devices 'for broadening the scope of simple regression approaches that commonly focus on a single dependent variable and a set of "predictors"' (p. 1).



A model of teaching based on the Berlin (Hamburg) school of instructional theory (Ruprecht et al. p. 69, translated by the author of this paper)

Illustration 2



A systems description of distance education in model form (Erdos p. 11)

The simplified pictures of reality that models represent are nevertheless seldom exclusivelydescriptive. As indicated (cf. the Blalock quotation in footnote 3) they tend to show causal relations and to make clear what in a system are the independent and dependent variables. A somewhat sophisticated example where this is explicitly the case is provided by Nilsen 1975 in his study of the dissemination of new types of teaching and learning in adult education. In his model (illustration 3) results (students' achievements) and input (time, money) are the dependent variables, whereas frame factors and methods are independent variables. Input variables can be selected by the input being specified in advance. When investigated the results then become dependent variables. It is also possible to select the results by deciding in advance that the educational activity is to continue until certain results have been achieved. When measured, the input then becomes the dependent variable (Nilsen 1975, I, p. 13). In a similar way methods can be selected whereas, in principle, the frame factors are given.

In his study Nilsen elaborates this model with a view both to describing teaching/learning and to describing the dissemination and adoption of innovations.

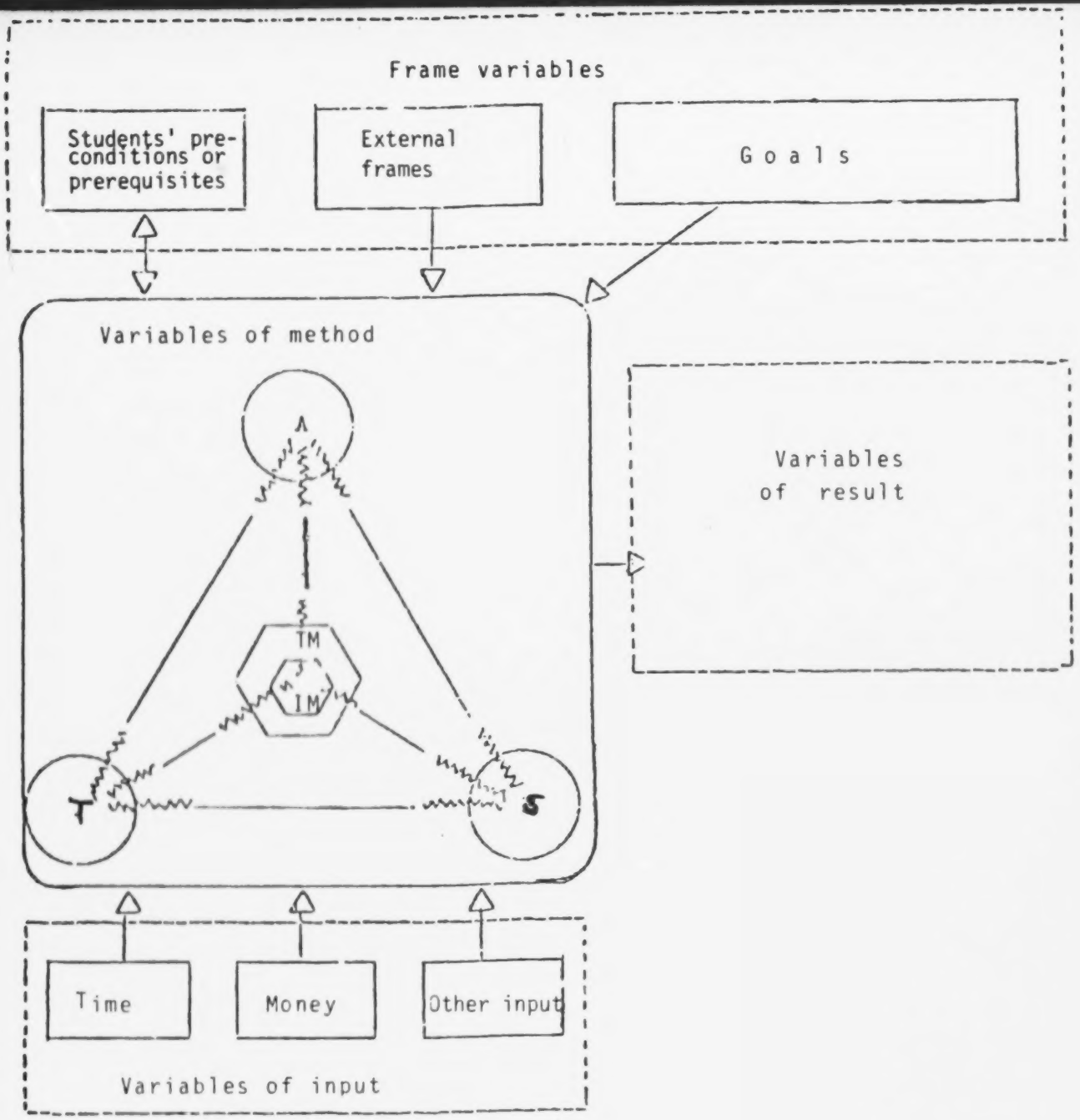


Illustration 3.
A simplified and translated version of Nilsen's model for the description of teaching (Nilson 1975, I, p. 15)

Nilsen's presentation has an evident model character in that by means of key words, defined abbreviations, arrows and symbols denoting relations and processes a kind of scheme explaining his approach is created. This also applies to the descriptive models mentioned above and to a number of other approaches to the problems of education. A case in point seems to be Gagnē's well-known hierarchical description of the forms of learning, from signal learning, stimulus-response learning, etc. to problem solving (Gagnē 1977).

A consistent application of a mathematical model in the form of 'formalised concept maps in a science of education' occurs in van Rooyen & Wolvaardt 1982. It is of an algorithmic character unlikely to attract non-behaviourists as it sees 'teaching as an attempt to construct a copy (model) of the teacher's current schema in the student's mind' (p. 51).

A fourth type of simplifying model is one which aims at delineating concepts and areas of research. Boyd & Apps 1980 have developed such a conceptual model for adult education based on 'transactional modes' (characterising the nature of the learner's situation: independence and individual, group or class learning, adults' learning as members of a community), 'client forms' (indicating who is to benefit from the educational activity - 'the individual, the group or the community') and 'personal, social and cultural systems'. The originators comment:

> Our model for adult education now has three dimensions - transactional mode, client focus, and system - each of which has three aspects. By visualizing a cube - each plane of which represents one of our educational dimensions, one may locate a given program in terms of three coordinates: its transactional mode, client focus, and predominant system.
>
> Using this model, we may now consider the goals of educational activities. The paramount goal of educational enterprises is growth: the growth of an individual, a group, or a community.
>
> (Boyd & Apps 1980 pp. 10 - 11)

It is claimed that this model makes several contributions to the field of adult education:

> First, this model contributes to demarcating a conceptual structure of the nature and parameters of adult education. The field of adult education, because it has relied heavily on other disciplines for its concepts, has suffered. Lacking an identity, a foundation that describes the field, adult education has grown and developed without any clear direction of what it is and what it should accomplish.
>
> Second, our **model** provides a framework for identifying and organizing problems in adult education. Using the model, we can systematically identify problems and questions and see the relationships among them.
>
> Third, this model is based on the structure of adult education, not on disciplines such as philosophy, psychology, or sociology. It provides a framework within which we can evaluate the applicability of theories and concepts developed in other fields.
>
> Fourth, the model integrates instruction and curriculum. Traditional views of education have often divided form and content, and have done violence to both in the process. Our model considers both as interwined in educational transactions. We look not on instruction, not on curriculum, but on educational transactions.
>
> Fifth, our model incorporates social and cultural value systems. Although a given program may focus on the growth of the individual adult student, administrators and instructors should not, indeed cannot, ignore cultural and social systems. Our model provides a structure by which we may examine systematically these various components of educational plans and programs.
>
> (ibidem p. 13)

In this and other cases the line of division between an argumentative outline of a theory - or a description - and a model is far from clear. The behaviourist stimulus-response theory, Ausubel's organiser theory and even Rogers' freedom-to-learn philosophy have - as indicated above - been described as models (cf. Bååth 1979), probably more because of their unmistakably distinctive characters than because of any simplifying description or presentation isolating dependent and independent variables. What in the educational debate is called a model, an approach or a theory seems often to depend on personal predilection rather than on clear-cut distinctions between these concepts. Certainly few educationists would object if, for instance, the Montessori or Steiner (Waldorf) types of education were

described as models.

What has been said so far will have illustrated what types of approaches have been regarded as educational models because of their distinctive characters. There are a number of competing schools of thinking that could claim to be models in this sense. One philosophically essential borderline which could cause a distinction between scholarly approaches of a model character will be looked into below. It concerns purely functional approaches attempting as far as possible to separate scholarship from value judgements contrasted with attempts at normative pedagogy.

Functional models

One model is called the 'rational model description of learning' (Nuthall & Snook 1973 pp.67 - 70). It is basically a non-psychological model based on the application of analytical philosophy to education. Proponents of this model see both learner and teacher as rational agents. 'Learning, therefore, should not be a process to which the student is subjected but an activity which he performs' (Nuthall & Snook 1973 p. 67). The same authors insist that 'the learning at which teaching aims is not definable as a change in behavior and it cannot be identified with some emotional reaction on the part of the learner. Teaching aims at knowledge. A student has learned when he knows, and knowing cannot be identified with giving answers, even correct answers' (ibidem).

Real knowing is taken to imply ability not only to give correct answers but to justify them. 'Learning is contrasted with conditioning, which suggests the stamping in of responses by means of reinforcement (Vesey, 1967)' (ibidem p. 68). As critical standards are found in the traditional academic disciplines it has been argued that there is a conceptual link between rationality, knowledge and the disciplines (Hirst 1965).

Other 'models' that are functional in the sense that they are concerned not with propagating certain values but with describing education, finding and prescribing efficient learning and teaching methods are, for instance, Skinner's behaviour-control model with its stimulus-response and condition theory (cf. Skinner 1968, Mager 1962), Ausubel's cognitive organiser model (Ausubel 1968, Hudgins 1971), Bruner's discovery learning (Bruner 1971), Gagnê's general teaching model (Gagnê 1977), Pask's holist vs. serialist learning strategies and his conversational theory (Pask 1976a-b, Entwistle 1978) as well as the equally interesting but less well-known approach called Structural Communication originally developed by J. G. Bennett and A. M. Hodgson (Egan 1976). Like the so-called rational model briefly described above, Ausubel and the structural-communication model reject behaviourism and its view of learning as conditioning. Learning is seen as the subsumption of new learning matter under already existing cognitive structures and is characterised by understanding rather than merely answering or 'behaving' correctly.[4] The issues concerned here are too well known to require further comment. The models as such are thoroughly looked into by Bååth 1979; classical exponents of the behaviourist-cognitivist controversy are to be found in Skinner 1957 and Chomsky 1959.

Cybernetic approaches have led to educational models of interest. Helmar Frank's and Felix von Cube's contributions stand out in this context. They base their thinking partly on psychological behaviourism, partly on mathematical information theory. Learning is seen as communication of information from a sender to a receiver. The receiver does

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4 It is perfectly possible to make the right operation for the wrong reason, as shown by the following example borrowed from Lewis 1974 p. 16. Anyone who believes that .3 x .3 makes .9 (instead of .09) and that .2 x .2 makes .4 (instead of .04) will no doubt, on the basis of a false understanding, come to the conclusion that .3 x .5 = .15, which happens to be correct. It is evident that the operation is not enough; attention must be paid to the understanding (justification) on which it is based.

not only receive the information, but stores and processes it. A statistical concept of information as something derived from probability is characteristic of the cybernetic approach, the idea being that certain elements of the learning material can be foreseen by the student. Since different receivers have different prior knowledge and different learning potential, a concept referred to as subjective information is introduced.

Cybernetics is a science not only of communication but also of control. The teaching/learning process is seen as an attempt to create a regulating circular movement, e.g. of the thermostat model. A change in one part of the circle is counteracted by developments or actions in other parts. This can be compared with a pilot's reactions to winds and currents. Immediate feedback in programmed learning represents part of this movement. The anticipation of a student's response and the development and programming of a corrective measure on the basis of an 'optimal strategy' are the necessary prerequisites. To develop algorithms for the optimisation of teaching is regarded as an important aim.

According to cybernetic theory learning implies that order is attained. This means that what occurs does not happen at random, but in a series that makes sense. Order is created through three learning processes, i.e. probability learning, on which see below, storage of information and supersign formation, i.e. the uniting of individual elements into larger units of knowledge (supersigns) allowing a greater amount of information to be stored in the long-time memory. Human capacity for informal approximations and supersign formation including new material into categories already assimilated leads to a reduction of the amount of information that is to be assimilated and thus influences learning behaviour. The less information that is to be assimilated in the long-time memory, the quicker is the assimilation.

Felix von Cube has developed this thinking into a cohesive redundancy theory based on a cybernetic approach, mathematically defining the probability of what a student can foresee. The gist of the redundancy theory can be described as follows: each study task contains a certain amount of information that is to be absorbed. Each item of prior knowledge and each step on the path of learning leads to a reduction of the amount of information left, and so does the capacity to form supersigns with the inclusion of new knowledge matter in its proper context. To the individual student the task then contains redundant information apart from what remains to be learned. The more that is learned, the smaller the amount of remaining subjective information and the greater the redundancy. Felix von Cube explains all learning processes by means of this theory. The fact that meaningful material is learnt more quickly than meaningless material is explained by the higher statistical redundancy in the meaningful material; thus the amount of information per unit to be learned is lower than in the meaningless material. Similar explanations are given of conditioning and learning by success.

Another functional German model of interest is the one known as the Berlin or Hamburg school. Paul Heimann is the founder of the Berlin school of didactics, a creation of the early 1960s, also characterised as lerntheoretisch (based on learning theory), kritisch and lehrtheoretisch (based on instruction theory). Heimann's chief disciple, Wolfgang Schulz, must probably be regarded as an equally important representative of this school as the originator. Both stress the implicational connections existing between decisions on content and those on method. Every teaching method, they claim, is on one hand based on decisions already made about content; on the other hand, aims and objectives cannot be set without attention being paid to the methods to be used in trying to attain them.

The Berlin school (which - as the 'Hamburg model' - is now centred in Hamburg, where Wolfgang Schulz has his chair) has developed a scheme for didactic decisions. It includes:

1 The aims of the teaching (Intentionalität); in a way seemingly parallel to Bloom and Krathwohl and their followers in the USA the cognitive, affective and psychomotor dimensions are stressed.
2 The concerns of the subject taught (Thematik); structuring according to logical and psychological principles; methodological questions specific for the subject taught (Fachdidaktik).
3 The methodology inclusive of: (a) the teacher's activity, (b) the organisation of the teaching (measures conducive to special learning processes like holistic vs. atomistic presentation, project method, programmed learning (etc.), (c) the social type of teaching situation (lecturing, conversation, group work), (d) the forms of action (lectures ex cathedra, questions, demonstrations, exercises, etc.) and (e) the teaching style (authoritarian, participative, etc.).
4 The selection of media.

Two further considerations belong to the four parts of the model. They concern the conditions of learning and teaching, the so-called anthropogenic, i.e. individual factors, and socio-cultural conditions (Ruprecht in Ruprecht et al 1975 p. 63 and Blankertz 1975 p. 102). These lead to a study of various societal frame factors and to a discussion of the influences on education of social and other ideas.

It is typical of the Berlin school that it insists on continuous criticism of ideologies (permanente Ideologiekritik). This may be interpreted as a wish to reveal any bias and partisan presentation, to see through prejudices and thus to separate value judgements from statements made in the name of scholarship and research. Considering the fact

that in German usage ideology often has a pejorative connotation, a less satisfactory interpretation may not be entirely impossible, i. e. that those opinions are to be criticised which in a given social situation are not considered acceptable (élitism, capitalism, imperialism, or liberalism etc.).

Normative models

In fact, whereas Heimann explicitly favours the former interpretation, Schulz appears to be under the influence of the second. In one work in which he pleads for some morally attractive principles like emancipation, solidarity and unveiling of vested interests, he seems implicitly to claim that another value judgement of his has scholarly status, i.e. his negativism against 'rational means-ends methods' (Zweckrationalität) to the extent that they do not serve his emancipatory ideals (Schulz in Ruprecht et al 1975, pp. 176, 180 - 181).

As indicated above, the school under discussion is now centred round the Hamburg chair of Wolfgang Schulz. In a recent paper (Schulz 1980) Schulz has confirmed his adherence to the principles referred to at the same time as he has modified the approach to some extent. To indicate developments and modifications Schulz uses as a sub-head in his paper the expression 'From the Berlin to the Hamburg model'. What was said above about Heimann's and Schulz's discussions of ideology seems relevant here. Typical of the new developments is a reserved attitude to unbiased and unengaged research as it were from a distance, which, Schulz believes, may conceal existing motives and weaken the link between theory and reality.

This implies conscious inclusion of value judgements in scholarly work. A number of vociferous educationists expressly favour partisanship in educational research. They occur everywhere, but seem to play a particularly

important part in the educational debate in the Socialst countries[5] as well as in West Germany. In West Germany radical social zeal as emanating from, for instance, the Frankfurt School of the Social Sciences (Adorno, Horkheimer, Habermas etc.) has to some extent been allied with a German tradition inherent in the so-called Bildungstheoretische Didaktik, i.e. didactics based on theories concerning the content of education.

Bildung - the result of education in a human being - is the basic concept of the so-called hermeneutic[6], historical 'bildungstheoretische' approach of Wilhelm Dilthey, developed further by Hermann Nohl, Erich Weniger, Joseph Derbolav, Wolfgang Klafki and others. This school is mainly concerned with deliberations about the very concept of education, its content and consequences (Bildung). Bildung is taken to mean the totality of motivation, knowledge,

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5 Cf. the following Czech testimony as translated into German and published in East Berlin: 'Mit diesem Ausdruck ("marxistische Pädagogik") wird betont, daß der dialektische und historische Materialismus, die marxistische Philosophie als Ganzes, die weltanschauliche und methodologische Grundlage der modernen Pädagogik ist, ganz gleich, ob sie von Wissenschaftlern in sozialistischen oder in kapitalistischen Ländern entwickelt wurde. Die marxistische Pädagogik entstand durch kritische Überwindung und prinzipielle Umarbeitung sowie durch konstruktive Bewahrung alles Positiven im pädagogischen Denken und in den pädagogischen Bestrebungen der Vergangenheit und Gegenwart. ... Wesenszug der wissenschaftlichen Qualität der marxistisch-lenistischen Pädagogik is ihr parteilicher und gesellschaftlich engagierter Charakter. Unter Parteilichkeit der marxistisch-leninistischen Pädagogik verstehen wir die theoretische Widerspiegelung der erzieherischen Erscheinungen, die den objektiven Interessen und Entwicklungsgesetzmäßigkeiten der sozialistischen und kommunistischen Gesellschaft entspricht und die sich in Einklang mit dem Marxismus-Leninismus - der wissenschaftlichen Ideologie der Arbeiterklasse, deren höchster humanistischer Wert in der allseitigen Entwicklung der Persönlichkeit besteht - befindet.

Grulich 1978 pp. 25 - 26

6 The term hermeneutic originally concerned text analysis. In German educational literature it refers to studies of the reality of teaching and descriptions of this reality.

skills and attitudes and their integration with one another. Educational values, largely of an ethical character, are understood as something transcending the acquisition of subject content and specific affective study objectives. Implicitly the attempts to define Bildung include the question of what it means to be an educated man or woman.

The stress is on aspects of content rather than on methods of study. This, however, does not imply emphasis on curricula designed as preparation for specific work situations, but, instead, on more general reflections on education and society (Blankertz 1975 p. 28). One important representative of this school, Joseph Derbolav, in 1957 referred to man being humanised by the filtering of intellectual knowledge in the conscience[7], which may serve as an illustration of its aspirations. Another present-day leading representative, Wolfgang Klafki, is respected in Germany for having defined Bildung as a uniting category bridging the gap between the claims of the objective world, which can include a canon of knowledge, and the individual's right to his own life. A field of study, a subject, is seen as suitable for educational intentions to the extent that its content can be accepted as conveying Bildung.
This seems to mean that it contributes more than what is specific to the subject itself, i.e. a kind of formal education (often contrasted with 'material', i.e. purely subject-based education).

Combining Weltbewältigung, i.e. mastery of life, and 'Personwerdung', i.e. the development of personality, is the chief purpose of this school of educational thinking.

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7 From 'Das Exemplarische im Bildungsraum des Gymnasiums', quoted by Ruprecht, in Ruprecht et al. (1975 p. 28) and elsewhere.

Klafki's wording of this principle, in which he explains Bildung as the surrounding world being open to man (the material and objective aspect) and man being open to this reality (the formal and subjective aspect) (Klafki 1975 p. 43), is quoted again and again in German educational literature with expressions of deep respect.

This seems - and largely also is - a speculative approach. It is an historical but still powerful exponent of German thinking. There seem to me to be two rather different present-day outcomes of the school of Bildungstheoretische Didaktik.

One is, as already indicated, related to the Frankfurt School of social science which, in the interest of 'emancipation', allows political decisions to control research and refrains from objectivity in applying its own values.

The second outcome is more trivial. In the latest presentation of the Bildungstheoretische Didaktik known to me, Klafki underlines some general principles, which can hardly cause much controversy, as typical of this school, thus: (1) the importance of the development of the learner's capacity for autonomoy and solidarity; (2) the connection of teaching and learning as a process of interaction by means of which learners gradully acquire more independence and not only learners but also teachers learn; (3) discovery learning and understanding as opposed to mere rote learning; (4) the participation of learners in the planning and realisation of teaching and (5) the concept of social learning (Klafki 1980). This thinking has been developed into a not very sensational perspective scheme and a model for the planning of teaching. Important background considerations are evidently critical examinations of social inequality and of conditions related to social class and regional provenance. The interrelationship of society and education is stressed.

The influence of this traditional school with its claims to

be able to prescribe values in the form of decisions about the aims and content of study is, as indicated, still strong in Germany. The same applies to the Frankfurt school referred to above. It is typical of this school that it rejects the assumption that scholarship should attempt to be neutral in relation to value judgements. This assumption is supposed to contribute to conserving the status quo. Theodor Adorno compares the separation of value judgements from research with capitulation before power, Jürgen Habermas states that it deprives analytical-empirical investigations of their contact with reality (Lebensbezug) and the advocates of this approach, generally in Marxist terms, stress the importance of considering society as a totality inclusive of its mechanisms of compulsion (cf. Adorno 1975, Horkheimer 1974 and - for a critical discussion - Kromphardt & Clever 1975).

This can all be related to the view that not only education but educational research should have as its main task to change society (in the direction of some kind of socialism or - in any case - anticapitalism) rather than to reveal and explain reality and/or create a basis for technology which indicates how and by what means educational aims can be obtained. When the adjective critical or the noun criticism (as in Ideologiekritik) is used, the idea is usually that traditional, bourgeois conceptions should be criticised, whereas so-called progressive virtues and aims are taken for granted.

The Frankfurt school calls its message the 'critical theory'. A so-called pedagogy of the critical theory has been developed. It implies on the one hand rejection of capitalist society, on the other hand great appreciation of an exchange of ideas and 'communicative competence', expected under ideal circumstances to lead to consensus. Although these ideal conditions do not exist, man is expected to act as though 'the ideal speaking situation' were reality, which is assumed to imply that the better argument consistently

prevails so that consensus may be attained. The regulative idea of the ideal speaking situation is supposed to legitimate educational goals and norms for action and further to reveal conditions which make it possible to query claims of validity with a view to attaining 'true consensus' (Mollenhauer 1978 2, pp. 79 - 85).

Another model to be mentioned in this context is represented by the so-called communicative or Critical-communicative didactics, an approach introduced by Karl Hermann Schäfer und Klaus Schaller. This school is quite explicit in stating that it does not limit its functions to the concerns of teaching/learning: its aims is the Comenius motto 'emendatio rerum humanarum', i.e. to improve society, whatever that may mean. In the form of a model it systematises the communicative aspects of didactics in two main categories (Bedeutungsebenen), on one hand the truism that teaching is a communicative process, on the other hand the demand that teaching and learning ought to become more communicative, i.e. more learner-oriented, more co-operative, more transparent, more participative and independent, less subjected to disturbance (Winkel 1980 p. 200). The former category is described as constituted by 'eleven axioms'. Teaching is studied under four aspects, (1) mediation (Vermittlung), (2) content (Inhalte), (3) relations (Beziehungen) and (4) disturbance (Störfaktizität), which may be a fruitful procedure when would-be teachers analyse teaching situations they are observing. Further, detailed systematic schemes for the planning of lessons etc. have been developed.

Ideological conflicts in the models discussed

It is evident that some of the models discussed represent positions within a philosophy of education leading to explicit concerns about ideological issues; on the other hand they aim at guiding the teaching-learning process and

for this purpose develop various schemes systematising the concepts that are important to them. This systematising can undoubtedly be helpful in some situations and plays some part in teacher training.

There is one line of division that is highly relevant in the ideological domain. Felix von Cube, the creator of the cybernetic redundancy theory, insists that value judgements can never be regarded as statements derived from research or scholarship and that thus they have no place in educational research. This is contradictory to the presentation of various kinds of moral aims (emancipation, for instance) as based on scientific considerations.

The interaction of value judgements and educational research is a fact that we may regret, but that cannot be overlooked. Travers is evidently right when he says,

> Many of the most persistent problems of education are ethical and moral and cannot be solved by the procedures that the scientist typically pursues. ... The scientist working on educational problems cannot entirely escape such questions even though he is in no position to provide answers.
>
> (Travers 1969 p. 6)

What the schools introduced above under Bildungstheoretische Didaktik and Critical-communicative didactics, as well as some representatives of the Berlin-Hamburg school, are not prepared to accept is the last part of this statement, i.e. that research and scholarship cannot solve value problems. Instead, they make their value systems (participative democracy, emancipation, etc.) the basis of their research (as explicitly stated by, e.g. Klafki 1976). Löwisch (1974 pp. 50 - 51) declares criticism to be productive through contributing an imperative in the form of an idea that serves as a regulator. To Mollenhauer (1973 p. 10) emancipation is the overriding idea both in education and in educational research. This normative approach is, of course, very different from recognising that it can be

necessary and desirable in educational research to identify and describe values and their influence.

What has been said so far may have given the impression that the German educational debate is dominated by those influenced by the Frankfurt school and its explicit partisanship. This is not the case, but this thinking is nevertheless widely spread as exemplified above. On the other hand there is also in Germany a fight against anything connected with obscurantism (here Wolfgang Brezinkas, Felix von Cube's and Lutz Rössner's names stand out), and no doubt many German educationists are inclined to agree with Kerlinger in his verdict:

> Such phenomena as ... targeted research, programmatic research, and, in Europe, emancipation research are mostly bizarre nonsense, bandwagon-climbing and guruism, little related to what research is and should be.
>
> (Kerlinger 1977 p. 10)

Under the influence of Karl Popper important contributions to the educational debate have been made advocating objectivity attained by pluralistic discussions but naturally recognising the inevitable bias of individual scholars, thus, for instance, by Wolfgang Brezinka and Hans Albert.

There is also an interesting controversy to be considered which concerns the influence of tradition on the content of education. This is clearly and rather aggressively verbalised by Blankertz in his criticism of von Cube (Abschlussdiskussion 1980 p. 248). The latter is said to regard non-technological values as emanating from arbitrary considerations (by refusing to accept value judgements and decisions on educational objectives as the result of scholarship). To Blankertz the content aspects, i.e. the objectives, have been provided for in a binding way by the educational traditions (referred to as 'European pedagogy').

He thus accuses von Cube of a denial of European scholarly history. This is a way of reasoning which is clearly based on the concept Bildung and illuminates the strong influence of the Bildungstheoretische Didaktik on present-day educational thinking in Germany.

Another difference of approach, concerned with the concepts of understanding and explaining, should also be mentioned. A study of the process of education will result in a description and an interpretation. The interpretive element has been called hermeneutic under the influence of the German school of 'Bildungstheorie'. One of the theses of its originator, Wilhelm Dilthey, was that whereas natural science deals with repeatable phenomena, the humanities are concerned with unique circumstances. In the latter case research is taken to aim at understanding, in the former case at explanation. Explanation can evidently lead to prediction and technology. Cf. Jarvie 1970 p. 231. To Dilthey and many latter-day representatives of 'Bildungstheorie' understanding rather than explanation is the aim of educational research. Whereas this thinking for many years played little part outside the European continent it has been given considerable attention in the 1970s. Hermeneutics has become something of a term à la mode, and reference to the hermeneutical view of the development of understanding in almost concentric circles, i.e. like a spiral, through repeated readings of a text, occurs fairly frequently (cf. Lindholm 1979, Palmer 1969). Gadamer 1975 appears to have influenced the debate strongly.

In fact, there seems to be little reason to dramatise the difference between the two approaches referred to, understanding and explanation. Irrespective of terminology and research tradition there is inevitably a need for description and interpretation of educational processes. Interpretation of what occurs may be an activity carried out for its own sake to illuminate human intentions and purposes, but may also serve the purpose of explanation, possibly leading to

prediction, and vice versa (Radnitzky 1970, Apel 1972). Huschge-Rhein 1979 postulates a difference of degree ('gradweiser Unterschied') between understanding and explanation. Cf. Nicolin 1981 p. 77.

The conclusions that can be drawn from interpretations are necessarily in many cases rather uncertain. Nevertheless they can illuminate the educational process and its frame factors in a very useful way as evident from experiences made in evaluation projects. Whereas in work of this kind attitudes and experiences are usually studied by questionnaire methods supplementing analyses of students' achievements, some educators go further in their attempts to give a complete picture of the students' situation, their interaction with the course and their particular difficulties. For this reason attempts have been made to find out not only what students' learning conditions are, but also what their life in general is as related to their study situation. This approach, which thus pays particular attention to the study milieu, is sometimes referred to as 'evaluation as illumination' (Parlett & Hamilton 1972). In-depth interviews are made with individual students with a view to coming to grips with what happens to them, to their life while they study, rather than to sample the general reactions of the students to the course under study, which is what happens when questionnaires are used. Duchastel refers to this as a pluralistic approach of course evaluation which seeks "to exteriorize the deeper, phenomenological impact which the course was hoped to have on a good number of the students" (Duchastel 1976 p. 4). See further Elton & Laurillard 1979.

For no good reason these interpretative attempts aiming at understanding are sometimes regarded as antagonistic to studies concerned with the effectiveness of education (Elgqvist-Saltzmann 1976; cf. Gage 1963 pp. 113 - 129 on 'criterion-of-effectiveness' paradigms versus 'teaching process' paradigms). Evidently both interpretation for the

sake of understanding as an aim in itself and interpretation as an instrument serving purposes of effectiveness are legitimate and important tasks for educational researchers. Understanding can be regarded as a heuristic operation on which hypotheses are based (Abel 1948). Further cf. Strike 1972. This leads us to a consideration of methodological problems.

Models concerned with educational research methods

No scholarly method is unproblematic. Sensible application, an open mind to weaknesses and cautious conclusions are necessary corollaries to any truth-seeking procedure. Many findings are necessarily approximations. Their degree of certainty or uncertainty is related to the methodology applied. If interpretations are taken to provide more than linguistically secured information, there must needs be a considerable element of uncertainty. This concerns all hermeneutic understanding and interpretations (cf. Taylor 1971) and evidently also the interpretation of empirical findings.

Causal theories are usually tested statistically in that correlations between variables in a large number of cases are searched for. Here we come up against difficulties of inference. If a computed correlation coefficient is found to be significant, it gives information about the probability that there is a correlation in the population concerned only. Educationists must be very cautious in drawing generalising conclusions from correlation analysis and statistical inference generally (cf. Lessnoff 1974 pp. 67 - 74).

Other difficulties are also to be faced when empirical methods are applied to testing theories. As Popper has shown it is not possible conclusively to prove that a nomological theory, i.e. one assumed to be universally valid,

is true, but it may be possible to falsify it and replace it by a better one. The combination of empirical falsification with the emergence of a new theory will lead to the rejection of the former. On sophisticated versus naive falsification see Lakatos (1970 pp. 116 - 132) and on statistical discorroboration instead of falsification see Lessnoff 1974 p. 20. If Popper's principle of deduction and falsification is adhered to, normal statistical inference does not seem to be wholly satisfactory as it is concerned with generalisations induced from collections of data, thus with induction and probability rather than with deduction and falsity.

> In sum, statistical "tests of significance" which operate by comparing an observed distribution with one which "might have been expected by chance" turn the basic logic of statistical manipulation of variables inside out, reversing the methodology of falsificationism, and producing a verificationist bias. From our point of view, then, such tests must be considered inappropriate for purposes of hypothesis testing and, if they have a place in our methodology, this should be limited to the preliminary stages of theory formation ... (Ford 1975 pp. 405 - 406)

This would seem to be a rather pointed conclusion. It should, however, be borne in mind when testing procedures are considered.

In my view the greatest difficulty is that scholars may not draw a clear line of division between what they think reality should be like and what findings actually show. This is crucial for the credibility and respectability of educational research. This risk occurs in all kinds of research, also those which concern topics unlikely to stimulate partisanship[8]. Pet ideas have great capacity for surviving.

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8 Thus for instance, I have experience of this from philology and linguistics concerning problems like the authorship of 'Sir Thomas Moore' (a Shakespeare drama?) and the eighteenth century pronunciation of the vowel in words like cup (cf. Tannenbaum 1927 and Holmberg 1957 respectively). The phenomenon is no doubt well known to scholars in entirely different areas as well.

To meet this challenge requires pluralism and makes it vital that theories should be subjected to rigorous testing in the sense of Popperian falsification attempts. The problem is particularly great in the social sciences and education, where political bias and various kinds of wishful thinking tend to distort scholarly observations.

Interesting contributions to the philosophy of science made by Marxist thinkers make the risk for ideological distortion evident as they accept as a kind of creed a number of statements about the relations between the objects of research, as well as a class concept that seems less than crystal clear, and also adopt a starting position for social research which is based on an openly partisan, non-neutral, class philosophy. Their work is based on a belief that they are already in possession of the right basic solutions or approaches. Marxism also claims to make knowledge a revolutionary weapon (Liedman 1977 p. 46), a message not likely to be easily accepted by non-Marxists.[9] In any case it differs from general research endeavours aiming at truth-finding and refraining from political or religious commitments. If the political Marxist aims are rejected, the Marxist research position is clearly irrational.

Education as a research area is particularly vulnerable to bias as it is concerned with human beings with personalities, hopes and wills of their own. If we are not determinists in the sense that we totally reject the assumption that human will is in any respect free, then it is impossible to postulate any automatic cause-effect principle in research aiming at optimising educational methods and procedures.

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9 This should be qualified with a reference to the Popperian view of the principle of falsification as a weapon against dogmatic and totalitarian thinking - but not in favour of certain answers.

Here theories usually have to be limited to statements to the effect that if such and such a measure is taken under specific circumstances, then this is likely to facilitate learning. This can be reworded into the semblance of a nomological theory: if x, then conditions making y possible will be created. Nevertheless here we have something resembling 'Popper's idea of probability as a dispositional property of a situation with respect to some precipitating circumstance' (Scriven 1972 p. 110). The situation is somewhat different in general learning theory and other descriptive rather than prescriptive studies.[10] It has been stated that an agent's decision-scheme, i.e. set of attitudes to reality, problems and solutions, dictates what he will do if he acts rationally: when A, then the rational action will be B (Lessnoff 1974 p. 89 on Watkins' 'imperfect rationality').

Conclusion

The above discussion has shown that the model concept - though vague - is widely used. Studying various well-known 'models' actually implies surveying important theoretical approaches, categories and methods used in education and educational research. Those discussed above represent a selection which, though not wholly idiosyncratic, was made both with a view to including some German thinking largely unknown outside the German-speaking countries and on the basis of personal interest. The author's research

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10 The problems related to the concept of cause and effect in educational research and the endeavour to relate cause-effect relationships to statistical correlations have been studied by, for instance, Elton 1977 and Elton & Laurillard 1979. In social science generally this problem area has been much discussed. It is interesting to note that Durkheim 1964 considers explanation of social facts to be deterministic, not purposive: "a social fact can be explained only by pointing out another, antecedently existing social fact, such that the two sorts of social fact are positively correlated" (Lessnoff 1974 p. 97). Lessnoff stresses that "only perfect correlations of cardinal data are equivalent to universal laws of functional dependence" (Lessnoff 1974 67 - 71 and 97).

orientation toward adult and distance education constitutes part of the background for the examples selected. Other scholars would, no doubt, choose others.

The conclusion to be drawn from the above discussion and examples would seem to be that the description of a research phenomenon in education as a model can be useful if referring to distinctive, clearly delineated approaches. It can then include factual descriptions, presentations of hypothetical relations between variables and general interpretations of educational phenomena.

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